3.6.11 "I looked for warnings or stuff like that, instructions, anything." – Franklin Buono

Franklin Buono who was severely injured in the incident searched for *"warnings or stuff like that, instructions, anything"* moments before the Tyco Fire Products Test Tank ruptured.

Mr. Buono sensed that there was a potential problem as Mr. Foust was having difficulty filling the Tyco Fire Products Test Tank with compressed air. Mr. Buono in Deposition testified that *" – while Chris was tinkering with it" ... "I looked for warnings or stuff like that, instructions, anything."*

During this final step in the chain of events leading up the catastrophic failure rupturing the Tyco Fire Products Fire Suppression System Test Tank; in their Failure to Warn of Danger and the absence of warning labels associated with the use of the Test Tank, Tyco Fire Products deprived Mr. Buono of information which became his final opportunity to possibly avoid severe injury he suffered as a result of this incident.

In his Examination Before Trial on Tuesday July 23, 2019; when asked the question *"Have you personally formed any opinions as the why you think the accident occurred that day?"*; Mr. Buono replied *"No. I know -- it was preventable, but another than that..."*

[Examination Before Trial; p118 Line 23, 24 & p119 Line 2,3]

This page intentionally left blank.

4 Conflicting Information

This section of the report identifies conflicting information arising from review of documents provided. The relevant documents are identified and may be quoted. The report provides observations, and / or comments, and / or opinions, or all in the evaluation of the conflicted information.

4.1 TFP Ruptured Fire Protection Tank model and part number

4.1.1 Identification by Mr. Adam Menor, Director of Engineering, Johnson Controls

The ruptured tank is identified by Mr. Menor, Director of Engineering, Johnson Controls (in Deposition) [file "09.12.19_Buono_A.Menor.pdf"]; as a Kitchen Knight PCL-240T.

4.1.2 Identification in OSHA Evaluation of Ruptured Fire Suppression Tank

The tank is identified in the OSHA report[v] [Bates; Buono-Osha-0083], as a "Pyro-Chem Kitchen Knight® II PCL-300 cylinder assembly (P/N 551194).

4.1.3 Conflict between Mr. Menor's identification and the Kitchen Knight™ Technical Manual

There is conflicting information between Mr. Menor's identification, the Kitchen Knight™ Manual[ii], and DOT markings found on the ruptured tank.

FIGURE 1 – TFP TANK IDENTIFICATION BATES OSHA-BUONO 0083 FIG 2

Figure 2: Markings on tank from manufacturer.

Photo documentation as per OSHA Inspection Number: 1125359 "Evaluation of Ruptured Fire Suppression Tank" [v] in Figure 1 above identifies the ruptured tank as a DOT type 4BW 225. If as Mr. Menor suggests, the tank is a TFP model PCL-240 then; the DOT marking of the ruptured tank is inconsistent with information provided in the "Kitchen Knight™ Manual [ii]" Kitchen Knight™ Manual [ii] with reference to the PCL-240 tank states; "The cylinder is manufactured, tested, and marked in accordance with DOT 4B175".

The Kitchen Knight™ Manual [ii] with reference to the PCL-240 tank states "The cylinder is manufactured, tested, and marked in accordance with DOT 4B175". It should be noted that the Kitchen Knight Manual™ [ii] references that "Cylinders come pre-filled with extinguishing agent..." which describes the system's Agent Tank. The TFP Kitchen Knight™ Manual [ii] is silent with respect to the PCL-240T Test Tank.

4.1.4 Mr. Menor's Identification of the Ruptured Fire Protection Tank

Reference the deposition of Adam R. Menor [file "09.12.19_Buono_A.Menor.pdf"], he identifies the ruptured tank as being "*a test tank from the Kitchen Knight system*" [P15 Lines 14 & 15]. With further clarification Mr. Menor indicates that the TFP test tank would leave the company including "*the cylinder itself as well as the valve assembly in an assembled state*" [P16 Lines 10 – 12]. After some discussion to precisely identify the ruptured tank Mr. Menor identifies the tank as follows; "*It would be a Kitchen Knight™ PCL-240T*" [P18 Lines 21 & 22].

4.1.5 Observations TFP Ruptured Tank identification conflict

4.1.5.1 DOT Markings and Tank Construction

The U.S. Department of Transportation (DOT) that has jurisdiction over the design and transportation of compressed gas cylinders and cartridges in the United States. The Pipeline and Hazardous Materials Safety Administration (PHMSA) is an operating administration within the U.S. Department of Transportation. Requirements are set forth in Title 49 Transportation; Subtitle B. Other Regulations Relating to Transportation; Chapter I. PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION, DEPARTMENT OF TRANSPORTATION; Subchapter C. HAZARDOUS MATERIALS REGULATIONS; Part 178. SPECIFICATIONS FOR PACKAGINGS; Subpart C. Specifications for Cylinders.

---

§ 178.1 Purpose and scope.

This part prescribes the manufacturing and testing specifications for packaging and containers used for the transportation of hazardous materials in commerce.

Subpart C—Specifications for Cylinders

§ 178.35 General requirements for specification cylinders.

(a) Compliance. Compliance with the requirements of this subpart is required in all details.

The fire protection cylinder referenced in the Kitchen Knight™ Manual [ii] is a DOT style 4B defined in CFR-2011-title49-vol3-sec178-50 as follows:

"A DOT 4B is a welded or brazed steel cylinder with longitudinal seams that are forged lap-welded or brazed and with water capacity (nominal) not over 1,000 pounds and a service pressure of at least 150 but not over 500 psig."

CFR-2011-title49-vol3-sec178-50

The ruptured fire protection cylinder markings "4BW 225 WORTHJ 08 98 M4543" indicate that it is a DOT style (4BW 225) welded type steel cylinder with a longitudinal electric-arc welded seam and maximum working pressure of 225 psig. The cylinder was manufactured by Worthington Cylinder – Jefferson (WORTHJ) in August of 1998 (08 98). Further information for cylinder identification is related to the DOT Identification Number (M-number); M4543 (approval date 07-Aug-1991) issued to Worthington Cylinder – Jefferson by DOT's Pipeline and Hazardous Materials Safety Administration (PHMSA) Approvals and Permits Division.

§ 178.61 Specification 4BW welded steel cylinders with electric-arc welded longitudinal seam.

(a) Type, size and service pressure. A DOT 4BW cylinder is a welded type steel cylinder with a longitudinal electric-arc welded seam, a water capacity (nominal) not over 1,000 pounds and a service pressure at least 225 and not over 500 psig gauge.

CFR-2018-title49-vol3-sec178-61

4.1.5.2 TFP Fire Protection Cylinder Dimensions

The dimensions of the two different Fire Protection Cylinders are very similar. Both cylinders in question the PCL-240 and PCL-300 have the same diameter according to a comparison between the Kitchen Knight™ Manual [ii] and the Kitchen Knight® II Manual [iii]. The assembly length from the bottom of the cylinder to the valve outlet connection is 1" greater for the PCL-300 tank as compared to the PCL-240 tank (see Figure 3).

Given the condition of the ruptured Fire Protection Cylinder (Figure 2) it is understandably difficult to make an accurate measurement for the distance from the bottom of the cylinder base ring to the centerline of the valve outlet connection. The OSHA inspection report [v] states that the tank had *"a length of approximately 22" excluding the valve assembly"*.

FIGURE 2 – TFP TANK IDENTIFICATION BATES OSHA-BUONO 0081 FIG 1

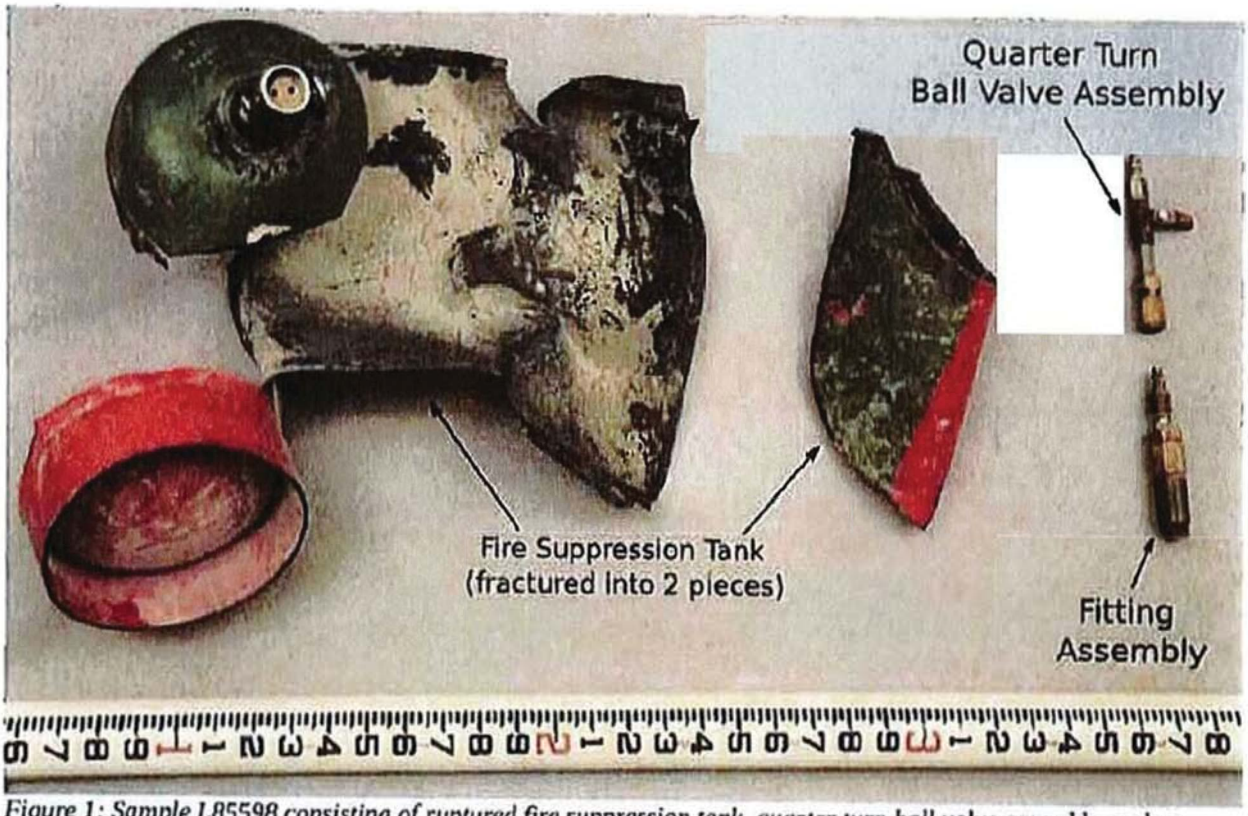
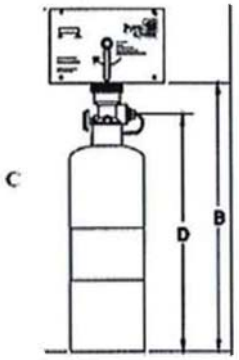


Figure 1: Sample L85598 consisting of ruptured fire suppression tank, quarter turn ball valve assembly, and an assembly of fittings.

FIGURE 3 – TANK DIMENSIONS KITCHEN KNIGHT™ MANUAL (LEFT) KITCHEN KNIGHT® II (RIGHT)

CYLINDERS &VALVE

The Pyro-Chem System has available three different size cylinders: the Models PCL-240, PCL-350, and PCL-550. Cylinder sizes are expressed in terms of extinguishing agent capacity (i.e., the PCL-240 uses 2.4 gallons of extinguishing agent). The cylinder is manufactured, tested, and marked in accordance with DOT 4B175. Cylinders come pre-filled with extinguishing agent and are charged with dry nitrogen to a pressure of 175 psig @ 70° F. Cylinder and valve assembly dimensions are shown in **Figure 2-1.**



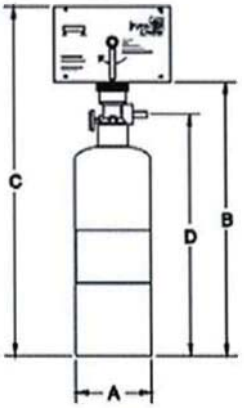
Model No.	A	B	C	D	Flow Point Capacity	Weight	Mounting Bracket Used
PCI-240	8.00	24.13	30.13	21.75	8	55 lbs.	MB-15
PCI-350	10.00	24.75	30.75	22.38	13	85 lbs.	MB-15
PCI-550	10.00	34.50	40.50	32.13	20	110 lbs.	MB-1

Figure 2-1. Cylinder and Valve Assemblies.

All cylinders utilize the same valve assembly (P/N 490-420720). It is a pressure sealed poppet type valve designed to provide rapid actuation and discharge of agent. See **Figure 2-2.**

CYLINDERS & VALVE

The Pyro-Chem Kitchen Knight II System has available three different size cylinders: the Models PCL-300 (P/N 551194), PCL-460 (P/N 551193), and PCL-600 (P/N 551196). Cylinder sizes are expressed in terms of extinguishing agent capacity (i.e., the PCL-300 uses 3.0 gallons of extinguishing agent). The cylinder is manufactured, tested, and marked in accordance with DOT 4BW225. Cylinders come pre-filled with extinguishing agent and are charged with dry nitrogen to a pressure of 225 psig @ 70° F. Cylinder and valve assembly dimensions are shown in **Figure 2-1.**



Model No.	A	B	C	D	Max. Flow Point Capacity	Weight	Mounting Bracket Used
PCL-300	8.00	25.06	30.81	22.75	10	53 lbs.	MB-15
PCL-460	10.00	25.06	30.81	22.75	15	83 lbs.	MB-15
PCL-600	10.00	35.81	41.56	33.50	20	108 lbs.	MB-1

Figure 2-1. Cylinder and Valve Assemblies.

All cylinders utilize the same valve assembly (P/N 551175). It is a pressure sealed poppet type valve designed to provide rapid actuation and discharge of agent. See **Figure 2-2.**

4.1.6 Identification of cylinders with DOT Markings

As discussed above, the Kitchen Knight™ Manual indicates that the PCL-240 cylinder is marked in accordance with DOT 4B175 lines 5 & 6 of the 1st paragraph of text in the left column above (Figure 3). The right-side column above 1st paragraph lines 6 & 7 indicate the cylinder is "marked in accordance with DOT 4BW225. The ruptured Fire Protection Cylinder is clearly marked as DOT style 4BW 225 as shown in Figure 1 (p31).

Based on the DOT marking and information from the TFP Technical Manuals the Fire Protection Tank would be identified as a PCL-300.

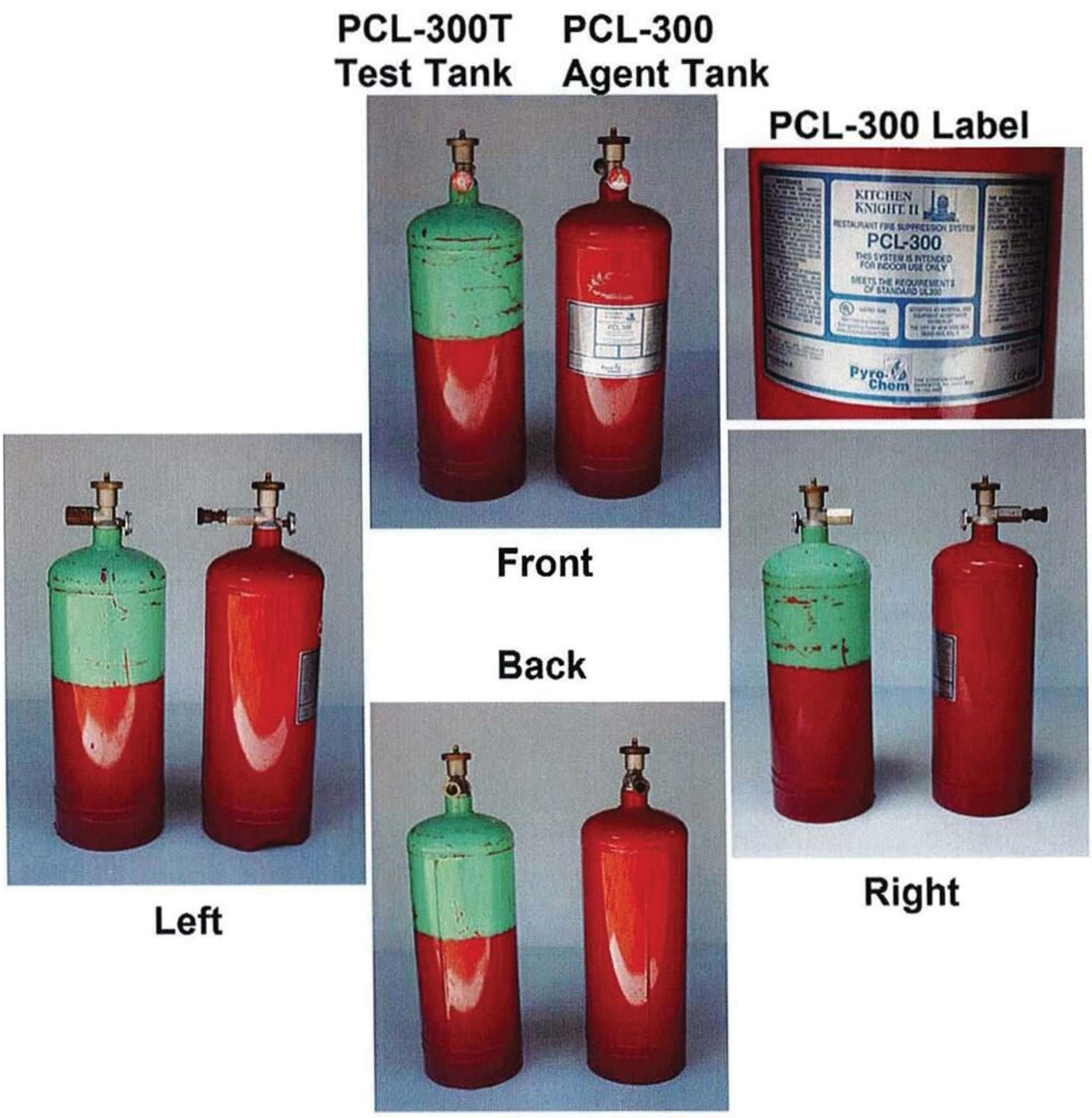
4.1.7 Identification of Agent Tank –vs– Test Tank

The OSHA report[v] [Bates; Buono-Osha-0083], identified the ruptured Fire Protection Tank as a "Pyro-Chem Kitchen Knight® II PCL-300 cylinder assembly (P/N 551194). This is consistent with information provided in the Kitchen Knight® II Manual[iii] as shown in the right-side column of Figure 3 (p35). Given that the ruptured Fire Protection Tank has no label or nameplate permanently attached, and the only markings are those as required by DOT and permanently marked by Worthington Industries, the cylinder manufacturer. At the time of OSHA inspection there was apparently no available reference to understand the difference between and Agent Tank and a Test Tank.

Mr. Adam R. Menor in his deposition [file "09.12.19_Buono_A.Menor.pdf"], identifies the ruptured tank as being "*a test tank from the Kitchen Knight system*" [P15 Lines 14 & 15]. In his deposition testimony, Mr. Menor states "So from my review of the OSHA report, looking at the pictures and the dimensions of the tank, it's a -- a test tank from the Kitchen Knight system."; what was not clarified in his testimony is what characteristics of the tank allowed the tank to be identified as a Test Tank rather than an Agent Tank.

Visual appearance that differentiates the Kitchen Knight system's Agent Tank and Test Tank is illustrated in Figure 4 below. The agent tank has the Kitchen Knight label and the Test Tank has the top half painted green and bottom half painted red with no Kitchen Knight label, only the required DOT marking by the cylinder manufacturer.

FIGURE 4 – KITCHEN KNIGHT AGENT TANK AND TEST TANK PHOTOS



4.2 Opinion – Ruptured Fire Protection Tank model and part number

It is my opinion that the Ruptured Fire Protection Tank is a TYCO Fire Protection Kitchen Knight®II Restaurant Fire Suppression System Test Tank model PCL-300T, part number 551024. Identification as a PCL-300 3.0 gallon Kitchen Knight®II tank is consistent with the tank's DOT marking by the cylinder manufacturer as described in the Kitchen Knight® II Manual [iii] [Bates; TFP-280809-000064]. The appearance of the Ruptured Fire Protection Tank's paint with the top half green and the bottom half red as is the observed paint color of the TFP Kitchen Knight System Test Tank. Finally, the Component List in the Kitchen Knight®II Manual [iii] identifies the PCL-300T Test Tank as part number 551024.

In view of conflicting information related to identification of the ruptured tank as discussed in the preceding sections, the actual TFP model and part number would be known if TFP had applied an identifying label to the tank. Absent any labeling by TFP, the model and part numbers are uncertain. However, the information, opinions, and results of this report related to the subject incident apply equally to the PCL-240 and PCL-300 Agent Tanks and PCL-240T and PCL-300T Test Tanks. These tanks are identified and described by the manufacturer TYCO Fire Products with various model and part numbers as components of the Kitchen Knight ™ RESTAURANT FIRE SUPPRESSION SYSTEM – PCL-240/350/550 and/or Kitchen Knight ®II RESTAURANT FIRE SUPPRESSION SYSTEM – PCL-300/460/600; or both.

In deposition Mr. Harding indicates that the differences between the PCL-240T and PCL-300 Test Tanks including "There are different nozzles, the valves are different, there's slight differences in the components." The specific to recharging and safety issues Mr. Harding indicated the following.

> *Q. Other than those distinctions, is there any comparison to the way, the method, in which a 240 as opposed to a 300 is recharged, or are the safety issues the same?*
>
> *A. They are recharged. I would say very similar. There are some differences but nothing -- nothing major.*
>
> *[Deposition Mr. Harding p18 Line 8 – 15].*

Therefore, it is my opinion that the information, analysis, and findings of this report apply equally to either the TFP Model No. PCL-240T Test Tank Part No. 550031 and the TFP Model No. PCL-300T Test Tank Part No. 551024.

4.2.1 Tank Identification in OSHA Report, Inspection Number 1125359

The OSHA Report, Inspection Number 1125359 identification as a *"Pyro-Chem Kitchen Knight I] PCL-300 cylinder assembly (P/N 551194)"* [Bates; Buono-Osha-0083] is inconsistent with the TFP Ruptured Fire Suppression Tank's paint with the top half painted green and the bottom half red.

4.2.2 Tank Identification by Mr. Menor, TFP Director of Engineering

In deposition [File name 09.12.19_Buono_A.Menor.pdf], Mr. Menor, TFP Director of Engineering identifies the tank as follows; " *It would be a Kitchen Knight™ PCL-240T* " [P18 Lines 21 & 22]. This identification is inconsistent with the Kitchen Knight™ Manual [ii] that states " *The cylinder is*

manufactured, tested, and marked in accordance with DOT 4B175. " [Bates; TFP-280809-000007]. The TFP Ruptured Fire Suppression Tank is clearly marked as a DOT 4BW225 style cylinder.

4.2.3 References to the TFP Ruptured Fire Protection Tank in this Report

Given that the documents reviewed at this time along with observations made of the TFP Ruptured Fire Suppression Tank, its markings, and paint color are all consistent with the information for a TYCO Fire Protection Kitchen Knight®II Restaurant Fire Suppression System Test Tank model PCL-300T, part number 551024; this report will identify the subject tank as such.

4.2.4 Absence of Labeling by TFP for the PCL-300T Test Tank part number 551024

The absence of labeling by TFP of the PCL-300T Test Tank part number 551024 has contributed to the confusion and conflicting information presented in efforts to identify exactly what TYCO Fire Protection component is the failed Fire Protection System Tank involved in this matter.

It is my opinion that the lack of labeling is also, in several ways, a contributing factor to the ultimate component failure in this matter.

4.2.4.1 TFP Fire Protection Tank – Construction

The tank was built in August of 1998 to DOT 4BW225 construction requirements, rated for 225 psig normal working pressure, as manufactured by Worthington Industries with PHAMSA Identification number M4543.

4.2.4.2 TFP Fire Protection Tank – Rupture

The tank ruptured during the subject incident at Oprandy's Fire & Safety Equipment in Middletown, New York, Friday morning the 12th of February 2016.

The OSHA Salt Lake Technical Center (SLTC) provided a report for Inspection Number 1125359 of the ruptured fire suppression tank identified as sample number L855598. A summary of findings is presented on page 9 in the discussion section [Bates; Buno-OSHA-0089].

Examination of this sample provided no evidence of any contributing factors other than overpressurization. Tank geometry, tear patterns, and examination of fracture surfaces all indicate ductile failure. No evidence could be found on the tank of corrosion, metal fatigue, or previous repair. None of the fracture surfaces examined showed any evidence of fatigue or stress corrosion cracking. The pressure required to rupture the tank can be as high as 1200 psi.

This page intentionally left blank.

5 Investigation of the Incident

On the day of the incident Friday morning the 12th of February 2016 at Oprandy's Fire & Safety Equipment in Middletown, New York the New York State Police were first responders and began investigation including a record of Scene Photos (reference; TFP's Production [TFP-280809-000114 - 172], and TFP's Production [TFP-280809-000173 - 231]). In addition, the U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) investigate beginning with Inspection number 1125359 on 02/12/2016 with an initial "Diary Sheet" entry "*Rec'd report of SIR (Severe Injury Report) from police*" [Bates; Buono-Osha-0004].

5.1 Evaluation of Ruptured Fire Suppression Tank

Forensic inspection of the ruptured fire suppression tank and components (sample number L85598) was conducted by the OSHA Salt Lake Technical Center (SLTC) with results presented in a report dated 05 May 2016 [Bates; Buono-Osha-0081 to 0091. The conclusion presented is as follows.

> *The Pyro-Chem Kitchen Knight II PCL-300 cylinder assembly (P/N 551194) discussed in this report ruptured as a consequence of being over-pressurized.*
>
> *[Bates; Buono-Osha-0091]*

5.1.1 Tank material testing, mechanical strength, and estimated burst pressure

Material testing of the tank's steel sample measured hardness and determined an approximate tensile strength of the tank material. Based on a measured wall thickness of 1.5 mm and the thin walled hoop stress model SLTC estimates a burst pressure between 1100 and 1200 psi for a material of the cylinder's approximate tensile strength [Bates; Buono-Osha-0088]. This finding is consistent with DOT 4BW 225 psig specified construction and Worthington Cylinders testing of 1 out of every 500 cylinders is tested to 900 psig (4 times 225 psig working pressure). In his Affidavit, Jim Getter Senior Product Design Engineer states that there was never a failure of any cylinder subjected to this pressure test.

The SLTC report discussion of findings notes "*no evidence of any contributing factors*" and "*The pressure required to rupture the tank can be as high as 1200 psi.*" [Bates; Buono-Osha-0089]. It should be noted that in this context "contributing factors" refers to no evidence of corrosion, metal fatigue, or previous repair potentially compromising the mechanical strength of the cylinder.

5.1.2 Ruptured tank and parts inspection

After analysis at SLTC the fire suppression tank and components (sample number L85598) was available on Monday April 16, 2018 at Exponent, 420 Lexington Avenue, New York, NY. My visual inspection of the sample and evaluation of photo's taken during the inspection agrees with the SLTC finding that there is no evidence of corrosion, metal fatigue, pre-rupture mechanical damage, or other structural compromise of the cylinder.

I agree with SLTC findings the Direct Cause (see def. Appendix W §2 ¶2.6, p W-97) for catastrophic failure and rupture of the TFP fire protection was due to over-pressurization.

5.2 Root Cause Analysis – Rupture of the TFP Fire Suppression Cylinder

Root Cause Analysis (RCA) is a cause-effect evaluation of factors where-in the result is occurrence of an undesirable event. Merriam-Webster Collegiate Dictionary 11th ed.[vi] defines "**cause**" as "*something that brings about an effect or result*" and "**root**" is defined as "*something that is an origin or source*". RCA evaluates factors to determine the origin or source that brings about the effect or result.

There are various RCA methods. The methods and definitions vary based on the technology, purpose, and organization or guiding body employing the RCA method. These methods recognize that there may be multiple root causes associated with an event. It is also commonly accepted that; as described in the US Department of Energy "Root Cause Analysis Guidance Document" (DOE-NE-STD-1004-92) [vii] p3; in the time preceding an event; *"a Chain or cause and effect sequence in which a specific action creates a condition that contributes to or results in an event*".

The chain or sequence of tasks and/or actions and the surrounding conditions leading to an occurrence [vii] includes contributing factors that they alone do not directly cause an event. But rather contributing factors may increase the probability that an event will occur, or increase the severity of an event should it occur.

For this report, the event is catastrophic failure and explosion of a TFP Fire Protection Tank identified as a component part of a restaurant kitchen fire suppression system manufactured by TYCO Fire Products L.P. The DOT 4BW 225 M4543 WORTHJ 08 98. The Direct Cause (see def. Appendix W §2 ¶2.6, p W-97) for cylinder failure was overpressurization beyond the mechanical limits of the cylinder's design.

5.2.1 Root Cause: High Pressure Compressed Air Source

Filling the Fire Suppression Cylinder using a compressed air source with available compressed air pressure greater than cylinder design pressure limit.

> *"The [compressed air] source was a high-pressure Poseidon cascade system designed for filling breathing air tanks."*
>
> *[Bates; Buono-Osha-0034]*

The Poseidon cascade system consists of a quantity of 4 Taylor Wharton HC-4500 cylinders, 444 cu ft, complete with CGA-347 valve (see http://www.poseidonair.com/cascade/index.htm). The cylinders are identified with DOT Classification DOT-E 9421-4500 / TP6750 identifying the manufacturer as Taylor-Wharton (Harsco Corporation), Harrisburg, PA with 4500 psig working pressure and test pressure indicated as 6,750 psig.

> *The maximum pressure available from the Poseidon system was approximately 4000 psi.*
>
> *[Bates; Buono-Osha-0049]*

5.2.2 Root Cause: Failure to limit pressure (no higher than 25 psi above operating pressure)

When filling a Fire Protection Cylinder, the filling pressure should be regulated to no higher than 25 psig above the operating pressure which for the TFP Ruptured Fire Suppression Tank was 225 psig. Therefore, filling pressure is required by NFPA 10 Standard for Portable Fire Extinguishers to be regulated to no more than 250 psig.

> *NFPA 10 §7.8 Extinguisher Recharging and Extinguishing Agents.*
>
> *7.8.4.5.2 A regulated source of pressure, set no higher than 25 psi (172 kPa) above the operating (service) pressure, shall be used to pressurize fire extinguishers.*

Mr. Foust reported that the Pressure regulator was reportedly set to no more than 450 psig.

> *On the day of the accident, the regulator was working and I set it before I started filling the cylinder. [p3 ¶1 L6 & 7]*
>
> *On the day of the accident, I set the regulator pressure to no more than 450 psi. [p3 ¶1 L12]*
>
> *OSHA Statement Mr. Foust April 6, 2016 [115414-01(286333) - Investigations - Investigation - DocID 8229161.PDF]*

5.2.3 Contributing Factor: No overpressure safety relief valve

It is common to have over pressure safety relief valves and / or over pressure rupture disc blow out plugs installed in compressed air piping. These components reduce the potential to inadvertently over pressure the piping and connected components. The filling system connecting the high-pressure Poseidon cascade system to the Fire Protection Tank does not have any safety devices to prevent accidental over pressurization of the filling system.

The OSHA investigation report notes that there were no installed safeguards to prevent over pressurization.

> *The regulator on the Poseidon system and a quarter turn ball valve were used to control the pressure. No pressure relief devices or additional safeguards from overpressure were used. The regulator on the Poseidon system was reportedly set to about 450 psi during the filling operation. To determine if the cylinder was filling, the employees would listen for the sound of air flowing into the cylinder and watch the pressure gauge on the valve assembly on the top of the cylinder until it indicated the cylinder was charged.*
>
> *[BATES; Buono-Osha-0034 Line 7 – 11]*

5.2.4 Contributing Factor: Regulator's pressure gauge for tank filling has no calibration date

The Poseidon Cascade system includes 4 tanks and a pressure regulator. Gauges on the pressure regulator have no calibration label or other indication of the gauges' last calibration date.

> *NFPA 10 §7.8 Extinguisher Recharging and Extinguishing Agents.*
>
> *7.8.4.5.3 The gauge used to set the regulated source of pressure shall be calibrated at least annually.*

5.2.5 Contributing Factor: Using the cylinder gauge to check pressure

While attempting to fill the fire suppression system test tank with compressed air Mr. Foust's OSHA Statement of April 6, 2016 indicates that he did not see the pressure gauge go up.

> *I set everything up, I connected the cylinder, started filling the cylinder, never heard any air going into it, never saw the gauge ever going up, so I pressed the valve down three times and on the third time the thing exploded. [p3 ¶2 L3 - 5]*
>
> *OSHA Statement Mr. Foust April 6, 2016 [115414-01(286333) - Investigations - Investigation - DocID 8229161.PDF]*

The TFP Kitchen Knight™ Restaurant Kitchen Fire Suppression System Technical Manual and the TFP Kitchen Knight® II Restaurant Kitchen Fire Suppression System Technical Manual each note in the recharge section for Agent Tanks as follows.

> *NOTE*
>
> *The pressure gauge attached to the extinguishing system should not be used to determine when the charging pressure has been reached. A pressure regulator should be used.*

The TFP Kitchen Knight™ Restaurant Kitchen Fire Suppression System Technical Manual and the TFP Kitchen Knight® II Restaurant Kitchen Fire Suppression System Technical Manual are silent with respect to instructions for charging Test Tanks.

5.2.6 Contributing Factor: TFP Technical Manual no test tank recharging instructions.

The Manufacturer's design, installation and maintenance manuals produced by TFP for the Kitchen Knight and Kitchen Knight® II Restaurant Kitchen Fire Suppression System do not provide instructions, procedures, or guidance for handling Test Tanks listed as a component part of the fire suppression system. There are no instructions related to recharging test tanks with compressed air.

NFPA 17A §3.3.9 Manual.

*3.3.9.1 * Manufacturer's Design, Installation, and Maintenance Manual. The document referenced for design, installation, and maintenance of the listed wet chemical extinguishing system equipment.*

NFPS 17A Annex A Explanatory Material

A.3.3.9.1 Manufacturer's Design, Installation, and Maintenance Manual. It contains a description of the hazards that can be protected as well as the limitations of the wet chemical extinguishing system. This manual also requires that the wet chemical extinguishing system be designed, installed, inspected, maintained, and serviced i11 accordance with NFPA 17A.

5.2.7 Contributing Factor: TFP Technical Manual lacks description of test tank intended use.

The Manufacturer's design, installation and maintenance manuals produced by TFP for the Kitchen Knight and Kitchen Knight® II Restaurant Kitchen Fire Suppression System do not provide instructions, procedures, or guidance for the intended use of Test Tanks listed as a component part of the fire suppression system.

By deposition it is discovered that intended uses for Kitchen Knight Test Tanks include the following;

flushing the fire protection system piping with warm water after a system discharge;

drying the fire protection system piping with air after flushing the piping system;

performing routine maintenance including a requirement by NFPA 17A to verify that the agent distribution piping is not obstructed.

A. *So an agent tank is part of a fire suppression system, to protect a restaurant, in this particular case. A test tank is to be used in the testing of that system, specifically the piping of that system, to ensure the integrity of that piping, that there's no obstructions in the piping, so that when the agent tank would need to be discharged, that the system would have the ability to flow through the piping and suppress the fire.*

[Deposition of Mr. Menor p36 Line 20 – 25 and p37 Line 2 – 6]

The event occurred while a TFP Test Tank was being charged with compressed air in preparation to perform a system test to ensure the integrity the system's piping. The TFP Manuals do not identify this

intended use or provide instructions, procedures, or guidance for service technicians to prepare for and perform this required system test.

5.2.8 Contributing Factor: Training, no training records, lack of formal training.

Mr. Foust is the more experienced technician with about 2½ years of experience before the incident. There are no training records or certificates indicating formal training. Training included online courses and on-the-job "buddy training" with no formal training agenda, or specific learning objectives for knowledge, skills, and abilities.

> *My job was servicing fire extinguishers and building maintenance. I have had online training and also hands on training. There's online courses about servicing fire extinguishers. My on-the-job training entailed every aspect of my daily tasks - there was multiple days of it when I first started. I don't have any specialized training or certifications to service fire extinguishers or fill compressed gas cylinders. [p1 ¶1 L4 - 7]*
>
> *OSHA Statement Mr. Foust April 6, 2016 [115414-01(286333) - Investigations - Investigation - DocID 8229161.PDF]*

5.2.9 Contributing Factor: Training, TFP does not provide Test Tank documentation or training.

The manufacturer's design, installation, and maintenance manuals produced by Tyco Fire Protection provide no documentation with respect to instructions, procedures, or guidance for service technicians in the safe handling, recharging, use, or intended application of Test Tanks for the Kitchen Knight™ and Kitchen Knight II Fire Protection systems.

Training is unavailable either as informal training through use of TPF documentation, or in the formal factory certification training conducted by TFP.

> *"We looked back and there was never any training on test tanks."*
>
> *[Deposition Mr. Harding p28 Line 6 – 7].*

The NFPA definition of a Trained person documented in NFPA 17A, Standard for Wet Chemical Extinguishing Systems is shown below.

> *A person who has undergone the instructions necessary to safely design, install, and reliably perform the maintenance and recharge service in accordance with the manufacturer's design, installation, and maintenance manual. [17, 2017]*
>
> *[NFPA 17-A §3.3.18]*

Given that TFP does not provide Test Tank documentation or training in any form, it is impossible for any individual to receive the instructions necessary to "*safely design, install, and reliably perform the maintenance and recharge service*". Therefore, no individual can be trained with respect to TFP Test Tanks in accordance with NFPA requirements.

5.2.10 Contributing Factor: Lack of product labeling on TFP Test Tanks

NFPA Standards have many requirements for product labels (see §8.1 Product Labels Tyco Fire Products PCL-300T & PCL-300, p57) and the TFP Test Tanks do not have any Product Labels, Nameplates, Warnings, Instructions, Dangers, or any other safety or use information permanently attached to the TFP Test Tank. The only tank markings are those required by the DOT specification for 4BW cylinders [CFR-2018-title49-vol3-sec178-61].

It is common for manufacturers to use multiple methods of communication to warn of dangers associated with the use of a product. TFP includes such a label with the Kitchen Knight® II model PCL-300 Agent Tank as shown in Figure 5 below.

FIGURE 5 – TYCO FIRE PRODUCTS NAMEPLATE PART NO. PC551235 PCL-300 AGENT TANK

The product nameplate and warning labels are often the first communication available to users, purchasers, and anyone who could reasonably be expected to be harmed when using the product.

The TFP PCL-300 label Part No PC551235 prominently displays CAUTION Contents Under Pressure to the user with information such as the operating pressure of 225 psig, the factory test pressure 450 psi, if there are signs of corrosion or mechanical damage the cylinder must be hydrostatically tested. Additionally, the product nameplate identifies the Pyro-Chem Manual P/N 551274 and NFPA 17A which are two essential sources of additional information.

The product nameplate also prominently displays sections with information related to MAINTENANCE, RECHARGE, and WARNING.

The PCL-300T Test Tank is known to have "*the same inherent danger*" to those of the PCL-300 Agent Tank as relates to overpressurization as Mr. Harding stated in deposition. [Deposition of Mr. Harding p33 Line 12 – 18 and p34 Line 5 – 7]

> *Q. Thank you. And generally speaking, what is your understanding of the inherent dangers of refilling a tank with compressed air?*
>
> *A. Well, it's just compressed air, so if you -- if there's too much pressure, that would be the danger in itself.*
>
> *Q. So do you have an understanding that overpressurization of a tank, such as a tank utilized in a fire suppression system, can lead to the tank exploding?*
>
> ...
>
> *A. Okay. I would have to assume that it would be dangerous if you overpressurize a tank, yes.*
>
> *Q. Does overpressurization include or exclude a test tank versus an agent tank, or is it still the same inherent danger if you overpressurize tanks?*
>
> *A. I would say it's the same inherent danger.*

Even with the knowledge that the PCL-300T Test Tank has the "*the same inherent danger*" as the PCL-300 Agent Tank as relates to overpressurization TFP does not affix any nameplate, label, WARNING, CAUTION or HAZARD Labels on the PCL-300T Test Tank that TFP manufacturers.

The only markings are those required by the DOT specification for 4BW cylinders [CFR-2018-title49-vol3-sec178-61], which admittedly are not easily interpreted those who are not trained in DOT construction and marking requirements as evidenced by Mr. Harding's deposition quoted below. [Deposition of Mr. Harding; p32 Line 6 – 18]

> *Q. The test tank in this case, in which Mr. Buono was involved with, is it your understanding that it had a PSA marked -- psi marking of 225?*
>
> *A. I believe there was a DOT stamp on it of 225.*
>
> *Q. And in terms of your understanding, what does that 225 psi mean to a consumer?*
>
> *A. It's a DOT stamping, and I'm not completely up to speed on DOT stampings, but the 225 does signify the pressure.*

5.2.10.1 "I looked for warnings or stuff like that, instructions, anything." – Mr. Buono

Mr. Buono in deposition indicated that; when it became apparent that Mr. Foust was attempting to troubleshoot the tank filling problem, Mr. Buono looked for warnings or instruction labels on the tank. [Deposition of Mr. Buono; p81 Line 7 – 20]

Q. Did you ever examine the tank to look at anything that was written on the tank?

A. Yes.

Q. What did you look for?

A. I looked for warnings or stuff like that, instructions, anything.

Q. When did you look for warnings or instructions?

A. While we were -- while Chris was tinkering with it.

Q. What did you see on the tank?

A. I believe a date. That was about it. A lot of it was really worn.

This page intentionally left blank.

6 Manufacturer's Design, Installation, and Maintenance Manual

The Tyco Fire Products (TFP) Kitchen Knight® II: Restaurant Kitchen Fire Suppression System PCL-300/460/600 Technical Manual (Manual No. PN551274) [Bates, TFP-280809-000061 - 113] [iii] does not comply with NFPA 17A. With respect to the TFP model PLC-300T Test Tank Part No. 551204 that ruptured during the incident, the manual does not include *"instructions necessary to safely design, install, and reliably perform the maintenance and recharge service in accordance with the manufacturer's design, installation, and maintenance manual."*

6.1 NFPA 17A Standard for Wet Chemical Extinguishing Systems

Tyco Fire Products (TFP) has the obligation to adhere to the codes, standards, recommended practices, and guidelines that are referenced in their product publications. Therefore, adherence to NFPA 17A is required, as stated in their Data Sheet (Form No. PC2001192-07) [Bates, DPSvcs-Buono-000101], Product Overview (Form No. PC2013172-02), [Bates, DPSvcs-Buono-000105] and other promotional material such as Form No. Form No. PC2001207(6).

> **NFPA 17A Definition § 3.3.8 Maintenance.** Work, including, but not limited to, repair, replacement, and service, performed to ensure that equipment operates properly.
>
> **NFPA 17A Definition § 3.3.9.1 * Manufacturer's Design, Installation, and Maintenance Manual.** The document referenced for design, installation, and maintenance of the listed wet chemical extinguishing system equipment.
>
> **NFPA 17A Definition § 3.3.9.2 Owner's Manual.** A pamphlet containing the manufacturer's recommendations for inspection and operation of the extinguishing system.
>
> **NFPA 17A Definition § 3.3.18 Trained.** A person who has undergone the instructions necessary to safely design, install, and reliably perform the maintenance and recharge service in accordance with the manufacturer's design, installation, and maintenance manual.
>
> **NFPA 17A § 4.1 General.** Only system components referenced or permitted in the manufacturer's design, installation, and maintenance manual or alternative components that are listed for use with the specific extinguishing system shall be used.

6.1.1 Obligation to provide "Manufacturer's Design, Installation, and Maintenance Manual."

NFPA 17A requires the manufacturer to produce a Manufacturer's Design, Installation, and Maintenance Manual ("the manual"). "The manual" is required to train a person to safely design, install, and reliably perform the maintenance and recharge service in accordance with the manufacturer's design, installation, and maintenance manual. According to NFPA 17A "the manual" is essential in the definition of a "Trained" person [NFPA 17A § 3.3.18].

> ***NFPA 17A § 3.3.18 TRAINED.*** *A PERSON WHO HAS UNDERGONE THE INSTRUCTIONS NECESSARY TO SAFELY DESIGN, INSTALL, AND RELIABLY PERFORM THE MAINTENANCE AND RECHARGE SERVICE IN ACCORDANCE WITH THE MANUFACTURER'S DESIGN, INSTALLATION, AND MAINTENANCE MANUAL.*

6.2 TYCO Fire Protection Defective Manual.

The TFP Manufacturer's Design, Installation, and Maintenance Manual ("the manual") is defective with respect to the tank that ruptured, model PCL-300T test tank. The only reference to the tank that ruptured is a model and part number found in a table titled "COMPONENTS LIST" [BATES TFP-280809-000073]. There are no references in "the manual" that provide information to safely use the PCL-300T test tank while performing maintenance, recharge service, or any other intended use.

Given that the Tyco Fire Products is the manufacturer of the Kitchen Knight® II Restaurant Kitchen Fire Suppression System;

Given that the Kitchen Knight® II Restaurant Kitchen Fire Suppression System is promoted by Tyco Fire Products as meeting the requirements of NFP 17A Standard for Wet Chemical Extinguishing Systems;

Given that NFPA 17A § 3.3.9.1 defines documents including a "Manufacturer's Design, Installation, and Maintenance Manual".

Given that NFPA 17A § 3.3.18 defines a trained person as having "undergone the instructions necessary to safely design, install, and reliably perform the maintenance and recharge service in accordance with the manufacturer's design, installation, and maintenance manual."

Given that NFPA 17A § 4.1 states "Only system components referenced or permitted in the manufacturer's design, installation, and maintenance manual or alternative components that are listed for use with the specific extinguishing system shall be used.";

Given that the Tyco Fire Products PCL-300T Test Tank Part No. 551204 is identified in the Tyco Fire Products Kitchen Knight® II Restaurant Kitchen Fire Suppression System PCL-300/460/600 Technical Manual [Manual No. PN551274] COMPONENTS LIST on Page 2-10 [Bates TFP-280809-000073] as a component "referenced or permitted in the manufacturer's design, installation, and maintenance manual" [NFPA 17A § 4.1];

Given that beyond the PCL-300T Test Tank Part No. 551204 identification as a component of the Kitchen Knight® II system, the Tyco Fire Protection Kitchen Knight® II Restaurant Kitchen Fire Suppression System PCL-300/460/600 Technical Manual is silent with respect to the PCL-300T Test Tank Part No. 551204 and does not include "instructions necessary to safely design, install, and reliably perform the maintenance and recharge service" [NFPA 17A § 4.1];

Therefore, the Tyco Fire Products Kitchen Knight® II Restaurant Kitchen Fire Suppression System PCL-300/460/600 Technical Manual [Manual No. PN551274] is defective.

*Therefore, in accordance with the NFPA 17A § 3.3.18 definition "**Trained**" it is impossible for any person to be trained to "safely design, install, and reliably perform the maintenance and recharge service" [NFPA 17A § 4.1]" with respect to the Tyco Fire Products component "PCL-300T Test Tank Part No. 551204" [Bates TFP-280809-000073].*

Therefore, Tyco Fire Products is not compliant with NFPA 17A and has not fulfilled its obligation therein.

7 Manufacturer's Duty to Warn of any Danger

Tyco Fire Products has a general obligation (as do all manufacturers) to provide warning of danger that may arise in the use of the product. This warning extends to users, purchasers, and anyone who could reasonably be expected to be harmed when using the product. Tyco Fire Products technical manual states that maintenance of the system must be performed by authorized dealers, does not relive TFP from their duty to warn anyone who could reasonably be expected to be harmed when using the product.

In the fire protection systems industry, it is common for service providers to provide maintenance services on fire protection equipment for which they do not have recognition as an authorized dealer. It is reasonable to expect that service personnel that are not affiliated with the manufacturer as authorized dealers could be harmed when using the product. The manufacturer has an obligation warn of danger to all service personnel regardless of their authorization status.

7.1 Warn of Danger to those who could reasonably be expected to be harmed

In addition to the "duty to warn" as discussed in Section 1.4 p12, the warning must be available to users of the product. "*This duty extends to those using or purchasing the product, as well as to those who could reasonably be expected to be harmed by its use*[iv] ."

7.1.1 Tyco Fire Products Obligation "duty to warn"

Tyco Fire Products (TFP) duty to warn includes "those who could reasonably be expected to be harmed by its use". TFP could reasonably expect that service workers could be harmed by the use of the PCL-300T Test Tank.

TFP includes in "the manual" states "*Installation and maintenance of the system must conform to the limitations detailed in this manual and be performed by an Authorized Pyro-Chem Kitchen Knight® II dealer.*" [TFP-280809-000063]

In addition, "the manual" states "*... before attempting any system recharge, it is necessary to attend a Factory Certification Training Class and become certified to install, maintain, and recharge the Pyro-Chem Kitchen Knight® II Restaurant Fire Suppression System.*" [TFP-280809-000112]

7.1.1.1 Tyco Fire Products "duty to warn" includes Service Personnel

TFP has a duty to warn "those who could reasonably be expected to be harmed by its use" which includes all service personnel without limiting that protection to only those service personnel who are employees of an Authorized Distributor.

In the restaurant / kitchen fire suppression system market it is common for service companies to service equipment for which they have and authorized distributor contract. It is also common for service companies to provide equipment service without having an authorized distributor agreement with the manufacturer of equipment that they service.

7.1.1.1.1 Integrated Fire Protection – Norcross, GA

For example, Integrated Fire Protection is an equipment distributor with headquarters in Norcross, GA. The web-site company profile page states, "Integrated Fire Protection® provides our clients solutions from Engineering, Design, Fabrication, Installation, to Inspection, Testing and Maintenance of all Fire and Life Safety Systems."

[see Figure 13 – DPSvcs-Buono-000107 Integrated Fire Protection - Kitchen Fire Suppression; reference Appendix A, p A-83]

[see also Figure 14 – DPSvcs-Buono-000108 Integrated Fire Protection – Authorized Dealer; Appendix A, p A-84]

[see also Figure 15 – DPSvcs-Buono-000107 Integrated Fire Protection – Service Other Brands; Appendix A, p A-85]

7.1.1.1.2 Fire Systems Inc. – Smyrna, GA

Referencing Fire Systems Inc. web-site [https://firesystems.net/] they state: "Since Fire Systems, Inc. was founded 33 years ago, we have provided comprehensive fire protection services to all types of businesses across the state of Georgia." Fire Systems installs kitchen fire suppression systems from Kidde and Amerex. They go on to say "Theses systems must be inspected routinely in accordance with NFPA 17A. We perform all necessary inspections and maintenance on all types of kitchen hood systems.

[see Figure 16 – DPSvcs-Buono-000110 Fire Systems Inc - Installations; Appendix A, p A-86]

[see also Figure 17 – DPSvcs-Buono-000111 Fire Systems Inc - Maintenance; Appendix A, p A-87]

7.2 Tyco Fire Products Duty to Warn

Manufacturers have a general duty to warn and are obligated to provide adequate warnings for dangers associated with use of their product. Tyco Fire Products (TFP) failed in its duty to warn employees of Oprandy's Fire & Safety Equipment in Middletown, New York of dangers associated with use of the TFP Kitchen Knight® II Restaurant Kitchen Fire Suppression System component PCL-300T Test Tank Part No. 551204.

During the incident that occurred at; Oprandy's Fire & Safety Equipment in Middletown, New York, Friday morning the 12th of February 2016 the Tyco Fire Products PCL-300T Test Tank Part No. 551204 ruptured injuring two employees. The Direct Cause reported by the OSHA Salt Lake Technical Center (SLTC) "Evaluation of ruptured Fire Suppression Tank" 05 May 2016 Inspection Number: 1125359 [Bates, Buono-Osha-0081] was "*This fire suppression tank ruptured due to the internal pressure forces overcoming the material strength of the tank.*"

While the Direct Cause of the incident was over-pressurization of the tank a significant contributing factor in the tank rupture is Tyco Fire Product failure in their duty to warn of the danger associated with

over-pressurization of the Tyco Fire Products PCL-300T Test Tank Part No. 551204 that ruptured causing injury to the Oprandy's Fire & Safety Equipment employees.

Given that Tyco Fire Products, as the manufacturer of the PCL-300T Test Tank Part No. 551204 that ruptured causing injury to the Oprandy's Fire & Safety Equipment employees; has a ***general duty to warn of any danger from the intended or unintended but reasonably foreseeable use of its products****;*

Given that Tyco Fire Products ***duty to warn extends to those using or purchasing the product, as well as to those who could reasonably be expected to be harmed by its use****;*

Given that the ***danger of the PCL-300T Test Tank Part No. 551204 over-pressurization and tank rupture resulting in serious injury or death should be known to Tyco Fire Products to be a reasonably foreseeable use of its Test Tank;***

Given that it should be known to Tyco Fire Protection that it is common in the Fire Protection Equipment industry for service providers to perform inspections, maintenance, and recharge of kitchen fire protection systems "on all types of kitchen hood systems" [Bates, DPSvcs-Buono-000111] for which the service providers are not authorized dealers;

Given that it should be known to Tyco Fire Protection that is common in the Fire Protection Equipment industry service providers to work with all systems, those with manufacturers authorization and those without "Inspection, Testing, and Maintenance of all Fire and Life Safety Systems. We are Authorized Distributors of the Following Manufacturers." [Bates, DPSvcs-Buono-000108] "We also sell and service other industry brands such as:" [Bates, DPSvcs-Buono-000109];

Given that it should be known to Tyco Fire Products that based on normal industry practice, service personnel of Fire Protection Equipment industry service providers not authorized by Tyco Fire Products could reasonably be expected to be harmed by use of the Tyco Fire Products PCL-300T Test Tank, Part No. 551204;

Given that it should be known to Tyco Fire Products that statements made in the Kitchen Knight® II Restaurant Kitchen Fire Suppression System PCL-300/460/600 Technical Manual (Manual No. PN551274) such as "Installation and maintenance of the system must conform to the limitations detailed in this manual and be performed by an Authorized Pyro-Chem Kitchen Knight® II dealer." [Bates, TFP-280809-000063] and "... Pyro-Chem Kitchen Knight® II will not be responsible for system installations or maintenance performed by any non-Certified person(s)." [Bates, TFP-280809-000090] do not negate the general duty to warn of any danger from the intended or unintended but reasonably foreseeable use of its products including the PCL-300T Test Tank, Part No. 551204.

Therefore, filling the Tyco Fire Products model PCL-300T Test Tank, Part No. 551204; for its intended use as a compressed air pressurized test tank when conducting testing and maintenance of the Kitchen Knight® II Restaurant Kitchen Fire Suppression System is an intended or unintended but reasonably foreseeable use of its products.

Therefore, service employees of Fire Protection Equipment industry service providers, independent of their authorization status could reasonably be expected to be harmed by use of Tyco Fire Products

Kitchen Knight® II Restaurant Kitchen Fire Suppression System components including the ruptured model PCL-300T Test Tank, Part No. 551204

Therefore, Tyco Fire Products has a duty to warn industry service personnel of any danger from the intended or unintended but reasonably foreseeable use of its products (including the employees of Oprandy's Fire & Safety Equipment in Middletown, New York that were injured by the over-pressurization rupture of the PCL-300T Test Tank, Part No. 551204 that is listed as a component of the Kitchen Knight® II Restaurant Kitchen Fire Suppression System).

8 Duty to Warn, product labeling, training and instructions

There are many methods used by manufacturers to fulfil their duty to warn of dangers associated with use of their products. Two traditional methods for fulfilling this obligation are product labels, and instruction manuals. Tyco Fire Products failed to fulfill its obligation and duty to warn using either of these traditional methods, or any other method to warn of any danger from the intended or unintended but reasonably foreseeable use of its products.

8.1 Product Labels Tyco Fire Products PCL-300T & PCL-300

Tyco Fire Products is the manufacturer of the Kitchen Knight® II Restaurant Fire Suppression System – PCL-300.

The Kitchen Knight® II Restaurant Kitchen Fire Suppression System uses two similar tanks. *The PCL-300T Test Tank, Part No. 551204 and the PCL-300 Agent Tank 3.0-gallon cylinder assembly, Part No. 551194 [Bates, TFP-280809-000073]* as shown in the Components List of the Kitchen Knight® II Restaurant Kitchen Fire Suppression System PCL-300/460/600 Technical Manual. *"Cylinder sizes are expressed in terms of Extinguishing agent capacity (i.e., the PCL-300 uses 3.0 gallons of extinguishing agent)." [Bates, TFP-280809-000064].* The PCL-300 3.0-gallon cylinder assembly with extinguishing agent is also referred to as the "Agent Tank".

The two tanks, PLC-300T Test Tank and PLC-300 Agent Tank are shown with photos including multiple views, reference Figure 4 – Kitchen Knight Agent Tank and Test Tank photos, p37 [Bates, DPSvcs-Buono-000113]. The PLC-300 Agent Tank Part No. 551194 is labeled by Tyco Fire Products, while the PLC-300T Test Tank Part No. 551204 is not.

The incident as described in Section 0 p9 involves a tank (also referred to as a cylinder) that ruptured while being filled with compressed air. The ruptured tank, a model PCL-300T Test Tank, Part No. 551204 is manufactured by Tyco Fire Products without any product labeling of any kind. The only markings meet DOT requirements for the cylinder and are stamped in the shell by the cylinder's manufacturer Worthington Cylinder – Jefferson. [Bates, DPSvcs-Buono-000112]

8.1.1 Nameplate of the PCL-300 3.0 gallon cylinder assembly, Part No. 551194

8.1.1.1 OSHA Report 05 May 2016 Inspection Number: 1125359 references NFPA 10 § 7.7.4.5

"When pressurizing a tank section 7.7.4.5 (NOTE 2017 ed. NFPA 10 § 7.8.4.5) *specifies that "A rechargeable stored-pressure-type fire extinguisher shall be pressurized only to the charging pressure specified on the fire extinguisher nameplate." [Bates, Buono-Osha-0090].*

- The PCL-300 nameplate is compliant. In a section of the label marked *"RECHARGE"* the label states *"... AND PRESSURIZE TO 225 PSI (15.5 BARO AT 70°f (21°C)." [Bates, DPSvcs-Buono-114]*

8.1.1.2 OSHA Report 05 May 2016 Inspection Number: 1125359 references NFPA 10 § 7.9

"Regarding alternate uses for fire extinguishers section 7.9 (NOTE 2017 ed. NFPA 10 § 7.10.1) *is very clear that "Fire extinguishers shall not be used for any purpose other than that of a fire extinguisher." Even if the tank involved has been designated for testing or training purposes only, the same hazards exist and the same safety requirements apply." [Bates, Buono-Osha-0090]*

8.1.1.3 Other NFPA 10 Nameplate Requirements

NFPA 10 § 3.3.22.1 Extinguisher Service Pressure. The normal operating pressure as indicated on the nameplate or cylinder of a fire extinguisher.

- The PCL-300 nameplate is compliant. In a section of the label marked "***CAUTION***" the label indicates "*CONTENTS UNDER PRESSURE 225 PSI (15.5 BAR) OPERATING PRESSURE AT 70°F (20°C).*" *[Bates, DPSvcs-Buono-114]*

NFPA 10 § 3.3.22.1 Factory Test Pressure. The pressure shown on the nameplate at which a shell was tested at time of manufacture.

- The PCL-300 nameplate is compliant. In a section of the label marked "***CAUTION***" the label indicates "*CYLINDER FACTORY TEST PRESSURE 450 PSI (31 BAR). CYLINDER MEETS DOT REQUIREMENTS.*" *[Bates, DPSvcs-Buono-114]*

NFPA 10 § 7.8.1.3.1 For those fire extinguishers that do not have the gross weight marked on the nameplate or valve, a permanent: label that indicates the gross weight shall be affixed to the cylinder.

- The PCL-300 nameplate is compliant. In a section of the label marked *"RECHARGE"* the label states *"APPROXIMATE GROSS WEIGHT 55.7 LBS. (25.3 KG) (CYLINDER, AGENT AND VALVE)." [Bates, DPSvcs-Buono-114]*

NFPA 10 § 7.8.3.1 Only those agents specified on the nameplate or agents proven to have equal chemical composition, physical characteristics, and fire-extinguishing capabilities shall be used.

- The PCL-300 nameplate is compliant. In a section of the label marked ***"RECHARGE"*** the label states *"REFILL ONLY WITH 3 GAL. (11.4 L) OF PYRO-CHEM WET AGENT P/N 550702 AND PRESSURIZE TO 225 PSI (15.5 BAR) AT 70°F (21°C)."*
  [Bates, DPSvcs-Buono-114]

8.1.1.4 Other Nameplate Information provided on the PCL-300 Agent Tank Part No. 551194

The PCL-300 Nameplate identifies the cylinder and valve as "ASSEMBLY P/N 551194" [Bates, DPSvcs-Buono-114]

The PCL-300 Nameplate "CAUTION" label states "IF CYLINDER SHOWS SIGNS OF CORROSION OR MECHANICAL DAMAGE IT MUST BE HYDROSTATICALLY TESTED IN ACCORDANCE WITH NFPA 17A, OR IT MUST BE REPLACED." [Bates, DPSvcs-Buono-114]

The PLC-300 Nameplate "HMIS" (Hazardous Materials Identification System) label states "WET SOLUTION AGENT HMIS 2-0-0POTASSIUM CARBONATE/ALKALINE IRRITANT. NITORGEN

EXOEKKEBT GAS GNUS 0-0-0VERY COLD DISCHARGE. CONTENTS UNDER HIGH PRESSURE" [Bates, DPSvcs-Buono-114].

The PCL-300 Nameplate "MAINTENANCE" label provides maintenance information and referenced both the "OWNER'S MANUAL" and the "PYRO-CHEM MANUAL P/N 551274 AND NFPA 1TA STANDARD FOR WET CHEMICAL EXTINSUISHING SYSTEMS.

8.1.2 Nameplate of the PCL-300T Test Tank, Part No. 551204

As shown in photos of the Tyco Fire Products ruptured PCL-300T Test Tank; Figure 1 p31, there are no nameplates or labels attached to the PCL-300 Test Tank. The only tank markings are those stamped into the shell by the cylinder manufacturer. [Bates, DPSvcs-Buono-000112]

The multiple view photos of both the PCL-300 Agent Tank and the PCL-300T test tank; Figure 4 p37, show the position of the nameplate for the PCL-300 Agent Tank and the absence of any nameplate or labels on the PCL-300 Test Tank. [Bates, DPSvcs-Buono-000113]

8.1.2.1 With respect to the OSHA Report 05 May 2016 Inspection Number: 1125359

For the OHSA comments and requirements related to NFPA 10 in Section 8.1.1.1 above:

- The PCL-300T nameplate is NOT COMPLIANT, there is no nameplate.

8.1.2.2 With respect to the OSHA Report 05 May 2016 Inspection Number: 1125359

For the OHSA comments and requirements related to NFPA 10 in Section as relates to the PCL-300T Test Tank *"Even if the tank involved has been designated for testing or training purposes only, the same hazards exist and the same safety requirements apply." [Bates, Buono-Osha-0090]*

- The PCL-300T nameplate is NOT COMPLIANT, there is no nameplate.

8.1.2.3 Other NFPA 10 Nameplate Requirements

For the other NFPA 10 Nameplate Requirements discussed in Section 8.1.1.3 above.

NFPA 10 § 3.3.22.1 Extinguisher Service Pressure.

- The PCL-300T nameplate is NOT COMPLIANT, there is no nameplate.

NFPA 10 § 3.3.22.1 Factory Test Pressure.

- The PCL-300T nameplate is NOT COMPLIANT, there is no nameplate.

NFPA 10 § 7.8.1.3.1 For those fire extinguishers that do not have the gross weight marked on the nameplate or valve, a permanent: label that indicates the gross weight shall be affixed to the cylinder.

There is no marking to instruct that the tank be used for testing only an should contain only dry air pressurized to the Extinguisher Service Pressure listed on the nameplate.

- The PCL-300T nameplate is NOT COMPLIANT, there is no nameplate, no label and no gross weight marking on the valve.

NFPA 10 § 7.8.3.1 Only those agents specified on the nameplate or agents proven to have equal chemical composition, physical characteristics, and fire-extinguishing capabilities shall be used.

There is no marking to instruct that the tank be used for testing only an should contain only dry air.

- The PCL-300T nameplate is NOT COMPLIANT, there is no nameplate.

8.1.2.4 Other Nameplate Information provided on the PCL-300T Test Tank Part No. 551204

The discussion in Section 8.1.1.4 above describes the significant amount of information provided on the PCL-300 nameplate.

- The PCL-300T nameplate is has no additional information to warn of danger associated with use of the product, there is no nameplate.

8.2 Manuals; Kitchen Knight® II Restaurant Kitchen Fire Suppression System

Tyco Fire Products as the manufacturer of the Kitchen Knight® II Restaurant Kitchen Fire Suppression System provides written manuals that include information about the system including its components, design, installation, maintenance, recharge and other relevant information. Manuals include both an Owners Guide PN551017 and Technical Manual PN551274.

1. PRYO-CHEM® KITCHEN KNIGHT® II RESTAURANT FIRE SUPPRESSION SYSTEM, OWNERS GUIDE [Bates, DPSvcs-Buono-000115 – 118]
2. KITCHEN KNIGHT® II: RESTAURANT FIRE SUPPRESSION SYSTEM – PCL-300/460/600, TECHNICAL MANUAL [Bates, TFP-280809-000061 – 113]

8.2.1 Owner's Manual

NFPA 17A Standard for Wet Chemical Extinguishing Systems § 3.3.9.1 defines "Owner's Manual." as *"A pamphlet containing the manufacturer's recommendations for inspection and operation of the extinguishing system"*.

- Tyco Fire Products (TFP) published manual PN551017 "Pryo Chem® Kitchen Knight II Restaurant Fire Suppression System, Owners Guide" [Bates, DPSvcs-Buono-000115 – 118] is the TFP Owner's Manual.

The Tyco Fire Products Owner's Guide specifically states "This owner's guide is not intended to cover all requirements detailed in the Installation, Operation, Recharge, Inspection, and Maintenance Manual, Part No. 5451274".

The Tyco Fire Products Owner's Guide PN551274 is silent with respect to the PCL-300T Test Tank Part No. 551204 and does not provide any warning of dangers associated with its use.

8.2.2 Manufacturer's Design Installation and Maintenance Manual

NFPA 17A Standard for Wet Chemical Extinguishing Systems § 3.3.9.1 defines "*Manufacturer's Design, Installation, and Maintenance Manual.*" as "*The document referenced for design, installation, and maintenance of the listed wet chemical extinguishing system equipment.*"

- Tyco Fire Products (TFP) published manual PN551274 "Kitchen Knight® II: Restaurant Fire Suppression System – PCL-300/460/600, Technical Manual" [Bates, TFP-280809-000061 – 113] is the TFP "Manufacturer's Design Installation and Maintenance Manual".

8.2.2.1 Warning of Dangers in TFP Technical Manual; Test Tank PCL-300T (or PCL-240T)

As discussed in Section 6.2, p52 the Tyco Fire Products (TFP) manual PN551274 is silent with respect to the PCL-300T Test Tank Part No. 551204 and does not provide any warning of dangers associated with its use.

8.2.2.2 Intended Use in TFP Technical Manual; Test Tank PCL-300T (or PCL-240T)

There is no information in the TFP Technical Manual indicating the intended use of Test Tanks. There are no instructions for intended use, of the Test Tank. As per the Deposition of Mr. Harding p40 Line 16 – 25 and p41 Line 2 - 12

Q. Or I should say a price list. Have you seen the price list that includes the test tank?

A. Yes.

Q. It references the test tank as a component of the Kitchen Knight suppression system, correct?

A. Correct.

Q. Do you have an understanding as to whether the defendant put forward any documentation, and when I say documentation, I mean instructions or warnings or information or pamphlets, to consumers of Test tanks before 2016 that indicated what the defendant believed the intended uses were for such test tanks? And when I say test tanks, I'm talking about the type of test tank utilized by Mr. Buono.

A. So you're asking why there was not information put out for that test tank? Is that correct?

Q. That's a separate question, but you can answer that --

A. Okay.

Q. -- as well if you want.

A. Yeah, I don't know why information was not put out regarding the test tank.

8.2.2.3 Test Tank Recharging; PCL-300T (or PCL-240T)

The TFP There are no instructions for use, or recharging the Test tank. [Deposition of Mr. Harding p42 Line 20 – 25 and p43 Line 2 – 4].

Q. So, Mr. Harding, I want to make sure I'm -- I understand something conceptually here. I have, as provided to us in this case, the technical manuals for the Pyro-Chem restaurant kitchen fire suppression systems, including those that encompass the 240 size and the 300 size, and you as well have seen those documents in preparation for the deposition, correct?

A. Correct.

Q. And it's your understanding that those technical manuals do not encompass use or maintenance or instructions pertaining to test tanks such as a 240 test tank or a 300 test tank, correct?

A. That is correct.

8.2.2.4 NFPA 17A Maintenance Requirement

NFPA 17A Chapter 7 Inspection, Maintenance, and Recharging requires that semiannual maintenance be conducted. One element of that maintenance is item (3) under ¶ 7.7.7.1 which reads as follows.

(3) Verification that the agent distribution piping is not obstructed.*

The asterisk (*) following the number indicates the explanatory material in the paragraph can be found in Annex A. The material in Annex A is listed in Section A.7.3.3.1 (3) as follows.

A.7.3.3.1 (3) The following methods can be used to verify that piping is not obstructed;
(1) Disassembly of all piping
(2) Conducting a full or partial discharge test
(3) Utilizing other methods recommended by the manufacturer.

8.2.2.5 Test Tank Intended Use – Balloon Test (Puff Test); PCL-300T (or PCL-240T)

In his deposition Mr. Harding provided testimony related to intended use of the PCL-300 Test Tank as performing a "Puff Test" or "Balloon Test". This test is performed to the NFPA Chapter 17A 7 ¶ 7.7.7.1 (3) verify that piping is not obstructed. [Deposition of Mr. Harding p30 Line 13 – 25]

Q. For what purpose today is a test tank sold? In other words, what's the intended use that the test tanks are sold today?

A. I believe the intended purpose of a test tank today is for the puff test which we talked about earlier.

Q. Did you say puff test?

A. Yes.

Q. Synonymous with balloon testing?

A. Yes.

The difference between and "Agent Tank" and "Test Tank" as described by Mr. Menor in deposition. He indicates that a test tank is used to ensure the integrity of the piping, that there are no obstructions. [Deposition of Mr. Menor p36 Line 20 – 25 and p37 Line 2 – 6].

A. So an agent tank is part of a fire suppression system, to protect a restaurant, in this particular case. A test tank is to be used in the testing of that system, specifically the piping of that system, to ensure the integrity of that piping, that there's no obstructions in the piping, so that when the agent tank would need to be discharged, that the system would have the ability to flow through the piping and suppress the fire.

Although information is absent from the TFP Manufacturer's Design Installation and Maintenance Manual PN551274 "Kitchen Knight® II: Restaurant Fire Suppression System – PCL-300/460/600, Technical Manual" [Bates, TFP-280809-000061 – 113]; the test tank is intended to be used for a "Balloon Test". The injured employees of Oprandy's Fire & Safety Equipment were filling the TFP PCL-300T Test Tank with air in preparation for performing a "Balloon Test" as required by NFPA 17A (see ¶ 8.2.2.4 above) and consistent with the intended use of the Test Tank that ruptured during the incident.

8.2.2.6 Test Tank Intended Use – Flushing & Air (Nitrogen) Drying; PCL-300T (or PCL-240T)

The TFP Manufacturer's Design Installation and Maintenance Manual includes Chapter V SYSTEM MAINTENANCE; a section with the title "MAINTENANCE AFTER SYSTEM DISCHARGE" ¶ "3. Piping and Nozzles." [Bates; TFP-280809-000060] which states the following.

3. Piping and Nozzles.

All nozzles must be removed and disassembled. The Strainers and the nozzle orifices must be cleaned in warm water. Reassemble the nozzles and replace the nozzle caps.

Piping should be flushed with warm water and blown out with air or nitrogen.

After cleaning the piping, replace all nozzles in their proper location.

The TFP The Kitchen Knight™ Manual [ii] does not provide any information related to equipment, instructions, or procedures to flush and blow out the piping.

Mr. Harding in deposition indicated that flushing and drying the piping may have been an intended use known to TFP, [Deposition of Mr. Menor p57 Line 4 – 25 and p58 Line 2 – 25 and p59 Line 2 & 3].

Q. So do you see -- is there a section -- a subsection for piping and nozzles?

A. Yes.

Q. And within that subsection of piping and nozzles, does it essentially state in sum and substance that as part of the maintenance process, piping should be flushed with warm water and blown out with air or nitrogen?

A. Yes.

Q. And so before 2016, was that at least part of the maintenance instructions provided by Defendant as it pertained to the Kitchen Knight fire suppression system?

A. Yes.

Q. With what component, if any, of the fire suppression system, back in 2016, was an individual to flush the piping with warm water and then blow it out with air or nitrogen, if any?

A. That would be followed by maintenance after a system discharge.

Q. I understand the context --

A. Okay.

Q. -- in terms of when it would be done. My question is with what component, if any, of a fire suppression system offered by Kitchen Knight would an individual flush the piping with either or both warm water and then blow it out with air or nitrogen?

A. That I don't know.

Q. Would it -- would it be a test tank that would be utilized in terms of doing a balloon test or a puff test to blow out air from the test tank through the piping?

A. It is possible, yes.

Q. Was this something that was possible or known to -- to Defendant before 2016, that individuals were taking part in the maintenance of the suppression system such as blowing out the piping with air or nitrogen in the context of the piping and nozzles within the technical manual that we're discussing?

A. It may have been known, yes.

The use of Test Tanks both PCL300T (and PCL-240T) for flushing and drying the Kitchen Knight™ fire suppression system is a normal intended use of the Test Tank for maintenance after system discharge. Flushing and drying the TFP Kitchen Knight™ piping is indicated as a required maintenance action taken after System Recharge and before System Reset. The manual goes on to state; *"After reset of the fusible link line, the system can be put back into service by following the SYSTEM CHECKOUT AFTER INSTALLATION Section of Chapter IV."*

8.2.3 Tyco Fire Products Manuals are Deficient

The TFP Manufacturer's Design Installation and Maintenance Manual PN551274 "Kitchen Knight® II: Restaurant Fire Suppression System – PCL-300/460/600, Technical Manual" (the manual) [Bates, TFP-280809-000061 – 113] is deficient. The manual has serious omissions of information required by NFPA Standards.

The manuals are deficient in that;

- the manual does not provide required information describing intended use of TFP Test Tanks
- the manual does not provide instructions necessary to perform required service at 6 month intervals including but not limited to Balloon Test of the TFP fire suppression system.
- the manual does not provide required information to safely recharge TFP Test Tanks in preparation for service including Balloon Test of the TFP fire protection system.
- knowing that testing required by NFPA-17A including maintenance under "¶ 7.7.7.1 (3)* Verification that the agent distribution piping is not obstructed." was and intended use described as "Balloon Test" (or Puff Test) for the TFP Kitchen Knight Test Tanks (PCL-240T and PCL-300T) TFP failed to provide any instructions to prepare for or conduct any such routine maintenance test.
- maintenance actions required after system discharge as required by the TFP Kitchen Knight™ Manual including flushing and drying the piping system may have been known to TFP as an intended use of the TFP Kitchen Knight Test Tanks (PCL-240T and PCL 300T); TFP failed to provide any instructions to prepare for or conduct this required maintenance.

8.3 Tyco Fire Products Training

Tyco Fire Products training is conducted using the design installation and maintenance manual as the primary reference. According to testimony of Mr. Harding "... the majority of the training material is the manual." as referenced below [Deposition of Mr. Harding p25 Line 22 – 25 and p26 Line 2 – 12].

> *Q. What types of training materials or workbooks or presentations were utilized for the training?*
>
> *A. What they would receive is a -- a manual such as the one that we're looking at now. And that's -- that's the information they receive for training.*
>
> *Q. So in other words, the manual itself would be the totality of the materials provided for the training?*
>
> *A. It would be a large percentage of it. There may be some data spec sheets in there or cut sheets on products. But the majority of the training material is the manual.*

8.3.1 Tyco Fire Products Training Deficiencies.

Deficiencies in the Tyco Fire Products Manufacturer's Design, Installation and Maintenance Manual [Def. see Appendix W Glossary §2 Definitions ¶ 2.12 Manual. (NFPA 17-A §3.3.9), p W-98] leads to training deficiencies. As referenced above Mr. Harding in deposition established that the manual is the primary reference used for factory training.

8.3.1.1 Training Deficiencies, omission of required procedures

Given that the training manual is deficient in that it does not include required information related to;

the intended use of TFP Test Tanks;

the procedure to recharge TFP Test Tanks to prepare for a required test checking for piping blockage (Balloon Test);

the procedure to conduct "Balloon Test" (Puff Test);

the required maintenance procedure to flush and dry piping after a system discharge;

therefore, the factory training is deficient in providing *"... the instructions necessary to safely design, install and reliably perform the maintenance and recharge service..."* [see Def. Trained; Appendix W Glossary §2 Definitions ¶ 2.33 Trained. (NFPA 17-A §3.3.18), p W-100].

8.3.1.2 Technical Support for Fire Suppression versus Maintenance

With respect to training Mr. Curtis Harding provides Technical Support for Johnson Controls' pre-engineered products including dry chemical products and wet chemical products for fire suppression systems. In deposition Mr. Harding provides information comparing technical support for fire suppression system equipment as compared to equipment used for testing and maintenance procedures.

The following information indicates the technical support is provided for recharge of a tank with wet chemical agent used for fire suppression but not for a test tank used for testing and maintenance of the Kitchen Knight™ Fire Suppression System. [Deposition of Mr. Harding p28 Line 8 – 25 and p29 Line 2 – 18]

Q. In your industry, when you utilize the term recharge of a tank, can you just tell us what that means?

A. Referring to the fire suppression system, recharge of a tank is when you refill it with agent, wet chemical agent, and nitrogen.

Q. Have you ever heard in your industry people discuss recharging of a tank to include recharging it with air, compressed air, or nitrogen?

A. Typically I don't get into those discussions. I don't hear much about that. Because it doesn't relate to the fire suppression side of it.

Q. When you say typically that you don't hear about it because it doesn't relate to the fire suppression system side of it, then in what context do you hear about it, even though it might be uncommon?

A. Well, I know it's done. But it's not something that I support, technically support.

Q. In terms of your understanding that you know it's done, but don't support, what is your understanding of the context in which it has been done? In other words, what has been the intended uses that you knew about but might not have supported?

A. Well, I know it's done because we sell the test tank per a – an authority's request. So how they do that is -- is not something that I discuss with them. That would be on the authority's side.

Mr. Harding states that test tanks, which he does not provide technical support for, are sold by TFP; and "... *the intended purpose of a test tank is for the puff test...*" (Balloon Test) [Deposition Mr. Harding p30 Line 17 – 18].

Mr. Harding also states that factory certification training classes do not address proper use of the Test Tank. Mr. Harding goes on to state "*We looked back and there was never any training on test tanks.*" [Deposition Mr. Harding p28 Line 6 – 7].

Absent training records, or other individuals unknown to Mr. Harding at TFP providing training and technical support for the test tank, TFP Training is Deficient with respect to routine maintenance required by NFPA 17A § 7.3 Maintenance ¶ 7.3.3.1 (3) Verification that the agent distribution piping is not obstructed and the intended use of the TFP Test Tank to perform a "Balloon Test".

8.4 Tyco Fire Products Failure to Fulfill the Duty to Warn

Manufacturers have a general Duty to Warn of any danger from the intended or unintended but reasonably foreseeable use of its products. This duty extends to those using or purchasing the product, as well as to those who could reasonably be expected to be harmed by its use. Traditionally manufacturers fulfill this obligation using product labels, or instruction manuals, or both.

Tyco Fire Products (TFP) has failed in their Duty to Warn. The tank ruptured in the subject incident, model PCL-300T Test Tank Part No. 551204 had no labels of any kind affixed to the product.

Tyco Fire Products (TFP) has failed in their Duty to Warn. The TFP Manufacturer's Design Installation and Maintenance Manual only lists the model PCL-300T Test Tank Part No. 551204 as a component of the Kitchen Knight® II Restaurant Kitchen Fire Suppression System and does not provide warning of any danger from the intended or unintended but reasonably foreseeable use of the product.

Tyco Fire Products (TFP) has failed in their Duty to Warn. The TFP Owner's manual for the Pyro-Chem Kitchen Knight® II Restaurant Kitchen Fire Suppression System not provide warning of any danger from the intended or unintended but reasonably foreseeable use of the model PCL-300T Test Tank Part No. 551204 that ruptured during the subject incident.

Manufacturers of Fire Extinguishers and Fire Suppression Systems, such as Tyco Fire Products have a requirement to meet various codes, standards, recommended practices, and guides. Among those are Standards NFPA 10, NFPA 17, and NFPA 17A, NFPA (National Fire Protection Association) Standards are developed through a consensus standards development process approved by the American National Standards Institute.

Tyco Fire Products (TFP) has failed in their obligation to meet the requirements of NFPA Standards as they apply to the TFP model PCL-300T Test Tank Part No. 551204 that ruptured during the subject incident. NFPA Standards require Fire Extinguishers and Fire Suppression Systems have nameplates that list essential information such as operating requirements, warnings, and instructions for the fire extinguisher or system component. The model PCL-300T Test Tank Part No. 551204 that ruptured during the subject incident has no permanent nameplate, or labels affixed to the cylinder.

Given that Tyco Fire Products, as the manufacturer of the PCL-300T Test Tank Part No. 551204 that ruptured causing injury to the Oprandy's Fire & Safety Equipment employees; has a ***general duty to warn of any danger from the intended or unintended but reasonably foreseeable use of its products;***

Given that Tyco Fire Products ***duty to warn extends to those using or purchasing the product, as well as to those who could reasonably be expected to be harmed by its use;***

Given that the ***danger of the PCL-300T Test Tank Part No. 551204 over-pressurization and tank rupture resulting in serious injury or death should be known to Tyco Fire Products to be a reasonably foreseeable user of its Test Tank;***

Given that Tyco Fire Products has a duty to warn industry service personnel of any danger from the intended or unintended but reasonably foreseeable use of its products (including the employees of Oprandy's Fire & Safety Equipment in Middletown, New York that were injured by the

over-pressurization rupture of the PCL-300T Test Tank, Part No. 551204 that is listed as a component of the Kitchen Knight® II Restaurant Kitchen Fire Suppression System);

Given that the OSHA Report 05 May 2016 Inspection Number: 1125359 references NFPA 10 § 7.7.4.5 (NOTE 2017 ed. NFPA 10 § 7.8.4.5); and notes *"**When pressurizing a tank section 7.7.4. specifies that "A rechargeable stored-pressure-type fire extinguisher shall be pressurized only to the charging pressure specified on the fire extinguisher nameplate."*** [Bates, Buono-Osha-0090]; and the Tyco Fire Products model PCL-300T Test Tank, Part No. 551204 has no nameplate;

Given that the OSHA Report 05 May 2016 Inspection Number: 1125359 references NFPA 10 § 7.9 (NOTE 2017 ed. NFPA 10 § 7.10.1); and notes *"**Even if the tank involved has been designated for testing or training purposes only, the same hazards exist and the same safety requirements apply.**"* [Bates, Buono-Osha-0090];

*Given that **NFPA 10 § 3.3.22.1 Extinguisher Service Pressure.*** Defines ***"The normal operating pressure as indicated on the nameplate or cylinder of a fire extinguisher."*** and the Tyco Fire Products model PCL-300T Test Tank, Part No. 551204 has no nameplate;

*Given that **NFPA 10 § 3.3.22.1 Factory Test Pressure.*** Defines ***"The pressure shown on the nameplate at which a shell was tested at time of manufacture."*** and the Tyco Fire Products model PCL-300T Test Tank, Part No. 551204 has no nameplate;

*Given that **NFPA 10 § 7.8.1.3.1*** Requires *"**For those fire extinguishers that do not have the gross weight marked on the nameplate or valve, a permanent: label that indicates the gross weight shall be affixed to the cylinder."*** and the Tyco Fire Products model PCL-300T Test Tank, Part No. 551204 has no nameplate;

*Given that **NFPA 10 § 7.8.3.1*** Requires *"**Only those agents specified on the nameplate or agents proven to have equal chemical composition, physical characteristics, and fire-extinguishing capabilities shall be used.**"* and the Tyco Fire Products model PCL-300T Test Tank, Part No. 551204 has no nameplate;

Given that labels are a traditional method used by manufacturers to fulfill their Duty to Warn of any danger from the intended or unintended but reasonably foreseeable use of its products, and the Tyco Fire Products model PCL-300T Test Tank, Part No. 551204 has no nameplate or labels;

Given that labels are a reasonable method for a manufacturer to use, and warning labels are one of the most commonly used methods to effectively in communicate danger, and warning labels can reasonably be affixed directly to the product as evidenced by the Tyco Fire Products (TFP) nameplate Part No. PC551235 [Bates, DPSvcs-Buono-000114] *that TFP affixes to the model PCL-300 Agent Tank 3.0-gallon cylinder assembly, Part No. 551194 which is similar to the unlabeled TFP model PCL-300T Test Tank, Part No. 551204 that ruptured;*